

AMENDMENTS TO THE CLAIMS

Please amend the present claims and add new claims as shown below:

1. (Currently Amended) A data recording method, comprising the steps of:

[for] performing error correction encoding on input data for each encoding unit of a plurality of encoding units by use of a product code to provide error-correcting encoded data;
[[and]]

recording said error-correction encoded data on at least one track of a recording medium in at least one encoding unit, [comprising the steps of:]

sequentially recording a first sync-block on said at least one track of said recording medium, said first sync-block being constituted by adding an internal encoding parity to a data string of said input data constituting an internal encoding calculation data stream; and

after said first sync-block is completely recorded, sequentially recording a second sync-block, said second sync-block being constituted by adding the internal encoding parity to a data string of an external encoding parity constituting the internal encoding calculation data stream,
wherein in each item of said error-correction encoded data recorded on said at least one track of the recording medium in at least one encoding unit, the external encoding parity is calculated with the calculation being divided into a plurality of parts

2. (Cancelled)

3. (Cancelled)

4. (Currently Amended) A data recording apparatus, comprising:

an encoder performing error correction encoding on input data for each encoding unit of a plurality of encoding units by use of a product code to produce error-correction encoded data;

a recorder recording said error-correction encoded data on at least one track of a recording medium in at least one encoding unit,

an external encoding parity calculator for calculating and obtaining an external encoding parity for each encoding unit from a data string constituting an external encoding calculation data stream;

an internal encoding parity calculator for calculating and obtaining an internal encoding parity for each encoding unit from a data string constituting an internal encoding calculation data stream; and

a recorder recording a first sync-block sequentially on at least one track, said first sync-block being constituted by adding an internal encoding parity obtained by the calculation of said internal encoding parity calculator to a data string of said input data constituting an internal encoding calculation data stream, and recording a second sync-block sequentially after said first sync-block is completely recorded, said second sync-block being constituted by adding the internal encoding parity obtained by the calculation of said internal encoding parity calculator to a data string of the external encoding parity obtained by the calculation of said external encoding parity calculator, said data string of the external encoding parity constituting the internal encoding calculation data stream [The data recording apparatus according to claim 3],

wherein error-correction encoded data in m [pieces of] encoding units (where m is an integer of 2 or larger) is recorded on at least one track of said recording medium; and wherein said external encoding parity calculator includes at least said m [pieces of] calculating apparatus for calculating an external encoding parity.

5. (Currently Amended) A data recording apparatus, comprising:

an encoder performing error correction encoding on input data for each encoding unit of a plurality of encoding units by use of a product code to produce error-correction encoded data;

a recorder recording said error-correction encoded data on at least one track of a recording medium in at least one encoding unit,

an external encoding parity calculator for calculating and obtaining an external encoding parity for each encoding unit from a data string constituting an external encoding calculation data stream; internal encoding parity calculator for calculating and obtaining an internal encoding parity for each encoding unit from a data string constituting an internal encoding calculation data stream;

a recorder recording a first sync-block sequentially on at least one track, said first sync-block being constituted by adding an internal encoding parity obtained by the calculation of said internal encoding parity calculator to a data string of said input data constituting an internal encoding calculation data stream, and recording a second sync-block sequentially after said first sync-block is completely recorded, said second sync-block being constituted by adding the internal encoding parity obtained by the calculation of said internal encoding parity calculator to data string of the external encoding parity obtained by the calculation of said external encoding parity calculator, said data string of the external encoding parity constituting the internal encoding calculation data stream [The data recording apparatus according to claim 3],

wherein error-correction encoded data in m [pieces of] encoding units (where m is an integer of 2 or larger) is recorded on at least one track of said recording medium; wherein said external encoding parity calculator includes calculating apparatus in the number smaller than said m [pieces]; and wherein in each of the m [pieces of] encoding units of said data, the external encoding parity is calculated with the calculation being divided into a plurality of parts.

6. (New) A data recording method comprising the steps of:
performing error correction encoding on input data for each encoding unit of a plurality of encoding units by use of a product code to provide error correction encoded data;
recording the error correction encoded data on one or a plurality of tracks of a recording medium in one or a plurality of encoding units;
sequentially recording a first sync-block on one or a plurality of tracks, wherein the first sync-block is constituted by adding an internal encoding C1 parity to a data string of the input data constituting an internal encoding calculation data stream;
after completely recording the first sync-block, sequentially recording a second sync-block wherein the second sync-block is constituted by adding the internal encoding C1 parity to a data string of an external encoding C2 parity constituting the internal encoding calculation data stream, wherein the C2 parity is recorded at one time in a later stage.

7. (New) The method as set forth in claim 6, wherein the calculation of the C2 parity has been completed before its recording is started, so that the recording of input data can be initiated even before a group of the input data to be recorded on one or a plurality of tracks is entirely captured, thus enabling the time required from the initiation of the input of the input data to the initiation of the recording of this input data to be shortened.

8. (New) A data recording apparatus, comprising:
means for performing error correction encoding on input data for each encoding unit of a plurality of input units by use of a product code to provide error correction encoded data;
means for recording the error correction encoded data on one or a plurality of tracks of a recording medium in one or a plurality of encoding units;
an external encoding parity calculator for calculating and obtaining an external encoding parity for each encoding unit from a data string constituting an external encoding calculation data stream.

an internal encoding parity calculator for calculating and obtaining an internal encoding parity for each encoding unit from data string constituting an internal encoding calculation data stream; and

a recorder for recording a first sync-block sequentially on one or a plurality of tracks, and recording second sync-block sequentially after the first sync-block is completely recorded.

9. (New) The apparatus as set forth in claim 8, wherein the first sync-block is constituted by adding an internal encoding parity obtained by the calculation of the internal encoding parity calculator to data string of the input data constituting an internal encoding calculation data stream, and the second sync-block is constituted by adding the internal encoding parity obtained by the calculation of the internal encoding parity calculator to data string of the external encoding parity obtained by the calculation of the external encoding parity calculator, wherein the data string of the external encoding parity also constitutes the internal encoding calculation data stream.

10. (New) The apparatus as set forth in claim 9, wherein, when error-correction encoded data in m encoding units, where m is an integer of 2 or larger, is recorded on one or a plurality of tracks of a recording medium, at least m calculating apparatus for calculating C2 parity are provided.

11. (New) The apparatus as set forth in claim 10, wherein,, since the calculation of C2 parity in m pieces of encoding units is simultaneously executed in independent calculating apparatus, the calculations of C2 parity in m encoding units also is completed when a group of input data to be recorded on one or a plurality of tracks has been entirely captured, thus allowing the initiation of C2 parity recording to be made earlier, thereby enabling the initiation of input data recording to be made accordingly earlier.

12. (New) The apparatus as set forth in claim 11, wherein, when error-correction encoded data in m encoding units, where m is an integer of 2 or larger, is recorded on one or a plurality of

tracks of a recording medium, if there are calculating apparatus for calculating C2 parity in the number smaller than m , the C2 parity is calculated in each of the m encoding units of the data with the calculation being divided into a plurality of parts.

13. (New) The apparatus as set forth in claim 12, wherein, if there are calculating apparatus in the number smaller than m , the calculation of the C2 parity in the respective m pieces of encoding units is initiated after a group of input data to be recorded on one or a plurality of tracks is entirely captured, so that, when the calculation of the C2 parity in each of the m pieces of encoding units is performed with the calculation being divided into a plurality of parts, the calculation of the C2 parity in the m encoding units can be initiated before a group of input data to be recorded on one or a plurality of tracks is not completely captured so that the calculation of the C2 parity is completed at an earlier point of time, and the recording of the input data is initiated at earlier point of time.